Amount and Frequency for Irrigation Application

Amount and frequency of water needed to supply an athletic field depends on the type of turfgrass, soil texture, soil structure, climatic conditions and degree of compaction. These factors influence infiltration rate, water holding capacity, amount of moisture already present and drainage. Water should never be applied at a rate faster than it can be absorbed into the soil. In other words, the rate of application cannot exceed infiltration capacity. Otherwise, the water is wasted by leaching through the rootzone or running off the surface.

Turfgrass Species Water Requirements

Cool season grasses use water less efficiently and require more water compared to warm season grasses. Cool season grasses suffer in high temperatures because they lose more water to evapotranspiration than warm season grasses. Warm season grasses are much better adapted to heat and drought.

Cool season grass drought tolerance:

High drought tolerance	Tall fescue
	Perennial ryegrass
	Kentucky bluegrass
	Fine leaf fescues
	Bentgrasses
	Rough bluegrass
Low drought tolerance	Annual bluegrass

Measuring the depth of turfgrass roots helps determine the quantity of water available in the rootzone and how much water is needed. To maintain health of the turfgrass, most soils require enough water to wet the top 4 to 6 inches, which is where the majority of roots are located.

Soil Texture Influence on Water Requirements

Soil texture is also an important factor when determining how much irrigation to apply to an athletic field. Each type of soil has a different capacity to supply water to plants. For example, coarse sands can only hold about .5 inches of water per foot of soil, fine sands can hold up to 2 inches of water per foot of soil, and clay soils can hold up to 4.5 inches of water per foot of soil. Because of their limited water holding capacity, coarse soils require more frequent watering than finer textured soils. Each type of soil has a different infiltration rate. The primary cause of puddles and runoff is by applying irrigation at a rate that exceeds the infiltration rate.

Influence of Evapotranspiration on Water Requirements

Solar radiation, temperature, and relative humidity influence the amount of water lost from a plant. With increasing solar radiation, high temperatures and decreasing relative humidity, evapotranspiration increases. Evapotranspiration is a combination of evaporation of water from

the soil surface and plant leaves and the transpiration process plants use to cool off in high temperatures. An increase in evapotranspiration causes more water to be lost from the soil and plant and therefore increases the plant's need for water.

Amount and Frequency for Water Application

It is difficult to find the right balance between overwatering and not watering enough. Proper irrigation promotes a healthy, dense stand of turf, which decreases weed invasion and increases tolerance to insect and disease pressure.

Overwatering causes:

- rapid turf growth
- shallow rooting
- decreased tolerance to weed and pest invasion
- reduced tolerance to heavy traffic
- a surface that is more prone to compaction by athlete traffic and mowing equipment
- increased leaching of nutrients

Maintaining a wet soil is only acceptable under certain conditions, such as on newly seeded areas.

Not watering enough causes:

- bare areas
- sparse growth
- poor appearance
- weed invasion
- hard soil surface

Frequent, shallow watering promotes shallow rooting and weak turf that can be susceptible to disease and insect attack. It can also be more susceptible to damage from traffic. Shallow rooted turf allows for less flexibility with irrigation and needs to be watered more often.

Deep, infrequent watering promotes healthy, vigorous turf. It causes roots to grow deeper in search of available water. Extensive root systems allow for more access to water in the rootzone that is available for plant use. Turfgrass with deep roots have greater flexibility with irrigation because they have access to more water within the rootzone. In this situation, more reliance can be placed on rainfall to keep turf healthy. The healthiest turf is achieved by irrigating as thoroughly and as infrequently as possible.

Allowing turf to reach the wilting point between irrigation events promotes deeper rooting and helps plants develop drought and heat tolerance. However, if drought stress is left too long, the turf can become damaged by factors such as traffic and pests.

Visual Indicators of Heat Stress

Monitoring an athletic field will serve as a guide for when irrigation is necessary. Soil probes reveal the current amount of moisture in a rootzone, how deep plant roots are, and the soil texture to help determine how much water is needed. Surface visual indicators include reduced turgidity, footprinting, leaf folding, and uneven dew formation. Turfgrass areas can also change color and take on a gray, blue or purple cast.

Timing

Watering varies with the environment and climate. Less frequent watering is required in the spring and fall when there are cooler temperatures and longer roots. Hot weather in the summer requires more water.

The best time to water on a daily basis is between 10 pm and 8 am. It is generally less windy, cooler, and more humid. These conditions result in less evapotranspiration and more efficient application of water. Water pressure is usually better at night as well, which means water can be applied in a more uniform pattern.

Sometimes on hot, dry days, syringing may be necessary. Syringing is the light application of water to turf to prevent wilt and reduce canopy temperature during hot weather. Sometimes this may be all that is necessary for fields to survive the rest of the day until they can be watered during the night with the irrigation system.